

# PATENT ABSTRACTS OF JAPAN

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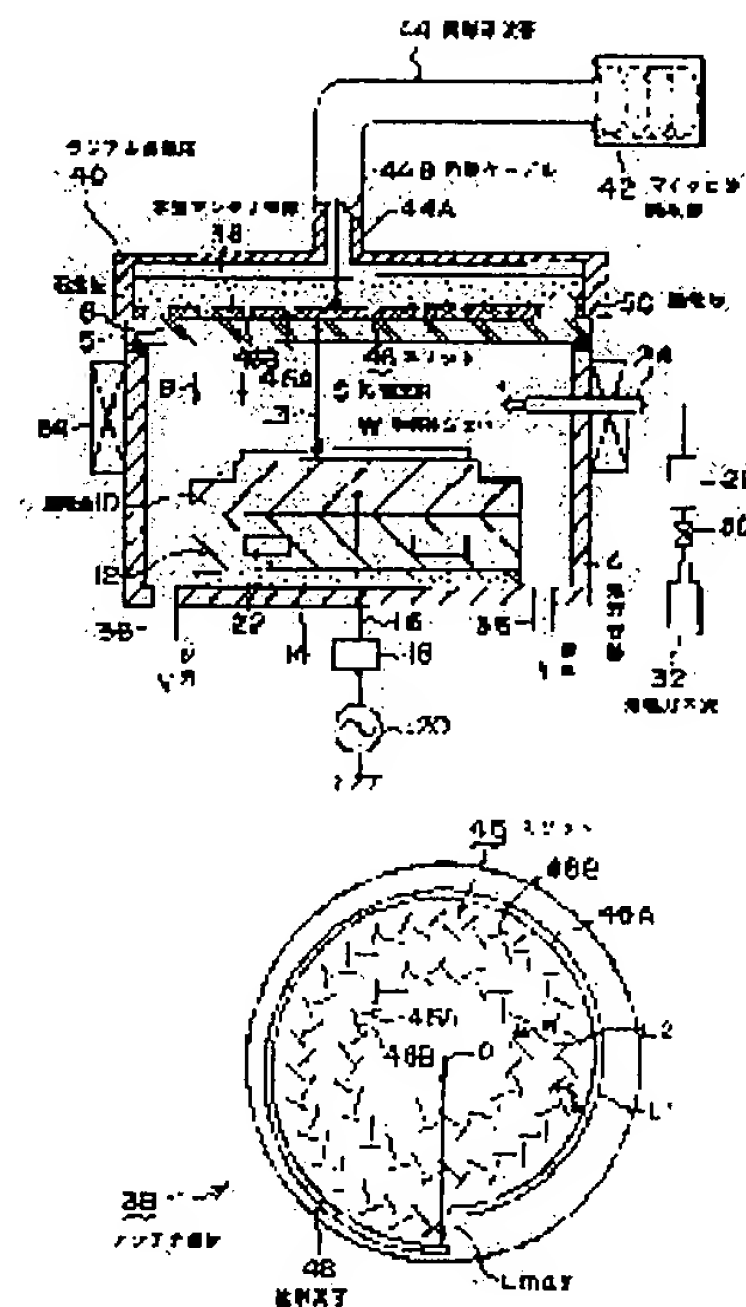
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## (54) PLASMA PROCESSING DEVICE

(57)Abstract:

**PURPOSE:** To generate plasma only with microwaves without using magnetic field by forming a number of slits concentrically or spirally in a plane antenna member, and emitting microwaves into a processing space.

**CONSTITUTION:** Through a gate valve, a semiconductor wafer W is accommodated by a transport arm into a processing vessel 4, and the wafer W is placed on a table 10 through a lifter pin. After the vessel 4 is evacuated, an etching gas such as CF<sub>4</sub> is supplied from a nozzle 24. At the same time, microwaves are introduced to the space S from a wave generator 42 so that a plasma is produced, and an etching process is conducted. The microwaves produced in the generator 42 are transmitted through a coaxial waveguide tube 44 in the TM, TE, or TEM mode to reach a disc-shaped antenna member 38 of a radial



waveguide box 40 and released to the space S via a crystal board 8 from slits 46A, 46B while transmitted to the peripheral part radially from the center of the antenna member 38 where an inner cable 44B is connected.

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3. In the drawings, any words are not translated.

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CLAIMS

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[Claim(s)]

[Claim 1] The processing container which formed the microwave introduction opening while the installation base in which the processed field is laid was established in the interior, The microwave generator which generates the microwave for plasma occurrence, and the waveguide for leading the microwave generated by this microwave generator to the aforementioned processing container, The flat antenna member prepared in the aforementioned microwave introduction opening so that it might have the slit of the masses formed the shape of a concentric circle, and in the shape of a whorl, it might connect with the aforementioned waveguide and it might counter with the aforementioned installation base, Plasma-treatment equipment characterized by constituting so that it may have the antenna cover member which covers this flat antenna member and holds the inside of the aforementioned processing container airtightly.

[Claim 2] Plasma-treatment equipment according to claim 1 characterized by the whole being made by the airtight structure while the dielectric for shortening wavelength of the aforementioned microwave intervenes between the aforementioned antenna cover member and the aforementioned antenna member.

[Claim 3] It is the plasma-treatment equipment according to claim 1 or 2 characterized by carrying out a field junction and making heat conduction good between the aforementioned antenna member and the aforementioned dielectric and between the internal surfaces of parietal bone of the aforementioned dielectric and the aforementioned antenna cover member.

[Claim 4] The aforementioned antenna member is plasma-treatment equipment according to claim 1 to 3 characterized by consisting of a thin electric conduction foil formed in the inferior surface of tongue of a thin electric conduction plate or the aforementioned dielectric of baking.

[Claim 5] Plasma-treatment equipment according to claim 1 to 4 characterized by forming the raw-gas induction for introducing a raw gas into the aforementioned processing container in the core of the aforementioned antenna cover member.

[Claim 6] Plasma-treatment equipment according to claim 5 characterized by forming the raw-gas supplementary induction for introducing a raw gas into the aforementioned processing container at the circumference section of the aforementioned antenna cover member.

[Claim 7] Plasma-treatment equipment according to claim 5 or 6 characterized by constituting so that the blowdown plate which has two or more gas ports may be formed in at least one of the aforementioned raw-gas induction and the aforementioned raw-gas supplementary induction.

[Claim 8] A part of aforementioned waveguide is the plasma-treatment equipment according to claim 5 to 7 characterized by constituting this hollow spool as a gas supply path which passes a raw gas to the aforementioned raw-gas induction while it consisted of a coaxial waveguide and the conductor was formed as a hollow spool among this coaxial waveguide.

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